Sustainable Education as a Factor in Regional Socio-economic Development

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Abstract: Sustainable development of the Russian Federation and its regions is among the most important tasks of the present time. Modern theoretical-methodological and scientific searches are aimed at establishing the factors of sustainable development of territorial socio-economic systems. The article is devoted to the study and structuring of practice-oriented and methodological approaches to regional development in the context of adapting the education system to the tasks of the digital economy. The main aspects of education system development, goals and objectives of national projects and programs in the field of economy, education and digitalization are considered. It is shown that the most important strategic direction of technological modernization of Russia is the improvement of the education system, the development of human resources capable of responding to innovative challenges and having the necessary professional competencies to implement large-scale projects in high-tech and knowledge-intensive industries. It is separately noted that the organization of scientific and educational clusters is designed to guarantee the staff potential for the development of innovative sectors of the economy, to provide points of growth of the investment climate in Russia. It is shown that at present time there is a transition of innovations development to the regional level, the issues related to generation and commercialization of scientific knowledge acquire great importance. The concept of entrepreneurial university, new opportunities and risks of digital transformation are considered.

1 INTRODUCTION

The idea of education for sustainable regional development is based on achieving a balance between economic wellbeing and the socio-cultural environment. Education, as a tool of socialization, starting from pre-school age, should prepare the younger generation for scientific and technological innovations, social change, and contribute to the formation of an active position in solving social problems. Economic and socio-cultural development of the Russian regions can only be achieved by creating a socially responsible society that is ready to adapt to new dynamically changing conditions provided that the education system is effectively integrated into the socio-economic environment of the region.

The digitalization of socio-economic processes and the need to revise approaches to learning during the spread of coronavirus infection in spring 2020 have posed a number of challenges for universities related to the implementation of educational programmes using e-learning and distance learning technologies in 2020, when the COVID-19 pandemic spread worldwide, most countries announced the temporary closure of schools and universities, which affected over 91% of the world's learners. Under these unprecedented conditions, the coordinated efforts of all participants in the educational process, the support of federal and regional governments, strategic partners enabled educational institutions of various levels to organize a rapid response system based on blended learning technologies, including distance learning technologies, e-learning, various video communication services, introduction of pedagogical design elements in online courses, asynchronous learning modes and ready-made packaged courses.

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Higher education institutions have begun to develop strategies for distance mobility, to train teachers to work with students in a digital environment, to assess their actions through reflection, which helps participants in the educational process to formulate the results obtained, to receive feedback from students, to redefine the goals for further work, ultimately contributing to an individual educational trajectory.

2 ECONOMICS AND EDUCATION: REGIONAL ISSUES AND CHALLENGES

With the rapid development of globalisation and informatisation processes, the level and pace of development of the national economy are inextricably linked to the state of the constituent entities of the Russian Federation. The current economic condition of the Russian regions is characterized by a number of problems of innovative and technological nature. The most relevant question becomes: what should be the driving force behind the socio-economic development of the regions? One of the most important indicators of socio-economic development of the region is science and innovation, namely:

- Internal expenditure on R&D;
- Volume of R&D performed;
- Volume of innovative products;
- Expenditures on technological innovation;
- Innovation activity;
- Number of patents for invention / Patent activity.

Obviously, the scientific and technological potential of each subject of the Russian Federation is primarily characterized by the state of (research and education) space, the most important subjects of which are universities. The region is becoming a subject of competitive relations, the task of providing the regional economy with highly qualified personnel, who are able to adapt quickly to the requirements of the economic system and the labor market, is relevant (Alikaeva et al., 2018). The solution to this problem is increasingly shifting towards improving the management of the regional education system and its interaction with the productive sector. At the same time, the status of universities as subjects of socio-economic development of regions is increasing (Zmyzgova et al., 2017).

The need for continuous improvement of education system management determines the relevance and practical significance of the development of new mechanisms of regional education policy (Shidov et al., 2018). In these conditions it is important to realize the innovative potential of tripartite mechanism of interaction between the state, business and universities.

It can be argued that there is now a steady trend towards the transformation of universities towards generating not only the knowledge that the university community has traditionally provided, but also that knowledge and in the specified timeframe that stakeholders need. The main stakeholders of the university in the external environment are the state represented by ministries and agencies, region, business community, non-profit organisations, educational networks, reference communities; in the internal environment - teaching staff, University staff, students and university communities.

The activities of the education system should be aimed at meeting the needs of the population and the economy of a particular territory. Comprehensive development of regional education systems means their transition to a qualitatively new state, growth of their potential, which will lead to increased opportunities for the implementation of educational needs of an individual, society and the state. Taken together, all these factors should contribute to the formation of modern regional educational space, which has a high scientific and technical potential and guarantees progressive regional development. Today, the success of a particular university depends on the coordinated actions of all participants of the educational process and representatives of society, business and government. It is important for the university to take into account the interests and needs of all these parties, to conduct an ongoing dialogue with them and provide an opportunity to influence the key factors of the university's activity.

The year 2021, as the year of science and technology, imposes a certain responsibility in solving the problem of development of intellectual potential of the country. The need to achieve new benchmarks should motivate the interest of businesses to participate in the whole chain of the technological process, from fundamental education and science to the scaling up of new high-tech Russian inventions and developments.

What are the mechanisms through which this can be implemented?

- Inclusion of the main regional partners in the collegial structures of HEI management, their responsible role in managerial decision-

making. (Establishment of employers' council for training areas; active participation of enterprises in regular updating of curricula);
- Internships for students in these enterprises, internships for teachers;
- Project-based learning;
- Dual education;
- Scientific research to meet the real needs of enterprises;
- Creation of joint laboratories, branded classrooms;
- Participation of teaching staff in expert and scientific-technical councils of enterprises.

On 20 January 2021, President of the Russian Academy of Sciences Alexander Sergeyev at the first meeting of the organizing committee for the Year of Science and Technology in Russia noted the priority of measures aimed at encouraging private companies to engage in practical cooperation with scientific institutes: "For example, for this purpose the RAS together with the ASI will work to attract both representatives of the business community and developers of scientific and technological solutions who already have their 'success stories' to the forum 'Areas of National Scientific and Technological Breakthrough 2030' to find opportunities for industrial implementation of Russian scientific developments.

2.1 Entrepreneurial University: An Incentive for Innovative Regional Development

Russia is currently witnessing a trend towards a new approach in classifying Russian universities: educational, research and entrepreneurial.

Educational universities focus exclusively on academic programmes, which are largely implemented with full public funding, including in the form of subsidies and grants. This category includes small regional universities, which have few or no serious resources to engage in research.

Research universities are capable of building up their own research activities by setting up their own R&D laboratories and making money on R&D.

A third type of university is the entrepreneurial type. These universities have considerable potential for funding R&D and its commercialisation. Entrepreneurial universities are characterised by diversified funding, relying primarily on their own resources; increasing self-financing as compared to public funding.

This type of universities can become the main key to the economic stability of regional and national economies, contribute to the growth of industrial production, innovation, creation of new high-tech and knowledge-intensive industries and jobs.

The foundations of the concept of "entrepreneurial university" are laid by B. Clarke (Burton and Clark, 2011). The main criteria of the entrepreneurial university are orientation to new sources of funding, initiation of new activities, creation of new business organisations, demonstration of entrepreneurial behaviour. Classic examples of entrepreneurial universities are the Massachusetts Institute of Technology, Stanford University and a number of European universities.

Universities of the third type consider the entrepreneurial aspect in their educational, scientific, innovative, educational and other types of activities, provide knowledge and develop skills that contribute to the development of entrepreneurial thinking, while forming their own ecosystem of entrepreneurship around the university.

Entrepreneurial universities play a key role in the innovative development of regions, ensure the transfer of new knowledge and technologies, create scientific and technological clusters (business incubators, small innovative enterprises, educational and scientific innovation complexes, educational and scientific production complexes, science parks, etc.) for new enterprises and organisations, and launch innovative regional initiatives.

A network of leading Russian universities (Zmyzgova et al., 2020) has now been formed in Russia as part of large-scale governmental measures and they are trying out various forms and schemes of educational and scientific-production integration. In 2011, the Skolkovo Foundation and a number of Russian universities created the Association of Entrepreneurial Universities of Russia. The declaration was signed on September 28, 2011 at the St. Petersburg International Innovation Forum. The initiators of creation of the association were the Skolkovo Foundation and the St. Petersburg National Research University of Information Technologies, Mechanics and Optics. Besides them, the declaration was signed by the Moscow Institute of Physics and Technology, National Research Nuclear University, Tomsk State University of Control Systems and Radioelectronics and National Research Technological University.

Every year, starting in 2016, the contribution of Russian universities to the development of the national economy is assessed. A subject ranking of universities' scientific performance, an index of

inventive activity, as well as a ranking of entrepreneurial universities are compiled.
The study assesses the contribution of Russian universities to the global development of technological entrepreneurship, including startups created by university graduates.

In 2020, the final ranking included 46 Russian universities, and only those universities with at least ten startups were considered. A separate ranking of business schools and economic universities (Financial University, Russian Academy of National Economy and Public Administration, Plekhanov Russian University of Economics, etc.) was prepared.

On February 15, 2021, the first meeting of the organizing committee for the Year of Science and Technology in Russia was held, chaired by Presidential Aide Andrey Fursenko and Deputy Prime Minister Dmitry Chernyshenko. Alexander Sergeev, President of the Russian Academy of Sciences, noted the priority of measures aimed at encouraging private companies to engage in practical cooperation with scientific institutions: "For example, for this purpose, the RAS together with the ASI will work to attract both representatives of the business community and developers of scientific and technological solutions who already have their 'success stories' to the forum "Areas of National Scientific and Technological Breakthrough 2030" in order to find opportunities for industrial implementation of Russian scientific developments".

According to Dmitry Chernyshenko, "defining new benchmarks that we intend to achieve, including through digital mechanisms, will increase business interest in participating in the entire chain of the technological process - from fundamental science to the scaling of Russian inventions and developments".

2.2 Engineering Education as the Basis for Regional Economic Development. "Engineer 4.0"

In the context of regional socio-economic development, it is primarily necessary to note the need for radical changes in engineering and business education. It is they that should focus on the long-term systemic processes of regional economy transition to the new digital technology platform (Prokofiev et al., 2018).

The urgent question for universities is how employers' interest in new, well connected business with education and science (Pecherskaya et al., 2020), contributing to the development of innovative type of entrepreneurship, ensuring the transfer of knowledge, research and development results to the external environment; trained development engineers convert into concrete interaction (Vásquez Bernal, 2012).

Many enterprises are now in a situation of constant technological renewal and they need to scale their innovation environment, which in turn requires a transition to new organisational solutions and the development of new professional competencies among employees. It can be argued that the competence profiles of managers and engineers are currently being integrated. Obviously, this trend should be reflected in the educational programmes of primary general, secondary vocational and higher education institutions. It is necessary to develop training programmes for system engineers for new business areas to create complex technical systems and products together with technological entrepreneurs who will be able to design new technological production processes.

Universities need to implement a rapid transition to a "university-partner" model in aligning educational programmes with enterprises, and it is important to move from a highly specialised engineer to a multidisciplinary staffing approach of the "engineer - researcher - technological entrepreneur" type. Obviously, under these conditions, it is necessary to expand the functional block of basic knowledge on new technological platform solutions in business education, while engineering education should emphasise the inclusion of technical systems in investment cycles.

Technological developments are leading to the fourth industrial revolution, resulting in Industry 4.0, which is based on artificial intelligence, robotics and the internet of things. "Industry 4.0 will force universities to change their approach to educating engineers (Baygin et al., 2016). We can talk about the specialisation "Engineer 4.0" as an important link in the fourth industrial revolution of "Industry 4.0".

Who are "Engineers 4.0"? They are professionals who understand modern processes and the changing world of the fourth revolution, and are able to adapt very quickly. They are systems engineers who understand the lifecycle of production systems of various nature, build their activities using digital twins and artificial intelligence systems, and possess a unique set of engineering competencies soft skills (Zmyzgova et al., 2020).

The main trends of Industry 4.0, such as the Internet of Things, additive manufacturing, virtual and augmented reality, robotics, artificial intelligence, and big data are reflected in engineering education (Calderón et al., 2020). New disciplines and training modules are appearing in the educational programmes and curricula to take into account the

peculiarities occurring in modern industrial production (Jeganathan et al., 2018).

We can talk about the concept of innovative approach "Education 4.0", which should correspond to "Industry 4.0" and prepare students for the next industrial revolution, which will occur in their lives.

2.3 "Education 4.0: Drivers of Digital Technologies in Learning

The introduction of elements of Industry 4.0 into industry and production requires an expansion of digital competences. Increasingly, companies are thinking about digital twins in production, artificial intelligence for operational and emergency decision-making and for predicting the condition of equipment. Adoption of artificial intelligence will enable machines and robots to adapt to change (Ciolacu et al., 2017).

Creative human capital, which is characterised by knowledge and skills in high-tech areas, continuing education and a willingness to change, is crucially important in this environment. These are new educational opportunities for which the concept of e-learning exists (Prokofiev et al., 2019).

"Industry 4.0" needs specialists at a fundamentally different level. Flexible educational paradigms, which will allow universities to overcome infrastructural limitations, using their educational technologies and cross-platform resources, will be the basis for the new format of learning.

In (Jeganathan et al., 2018) new approaches in organising content for Education 4.0 are considered. In particular, a discipline-independent curriculum structure of Education 4.0, which combines all engineering disciplines to create a unique discipline called "Engineering 4.0", is proposed instead of the current discipline-dependent curricula.

The term '4.0' refers to new technical capabilities for which the concept of e-learning or digital learning already exists. Alongside traditional approaches to learning, new e-learning formats are being considered. Some of them are intended for mass learning (Massive Open Online Courses, MOOC) and others for a small number of learners (Single Point Of Contact, SPOC). In terms of the use of e-learning tools in the Russian educational space, a trend can now be noted towards the refinement of existing and the creation of their own, new or significantly improved, e-learning tools (Golitsyna, 2020).

On 19 November 2020, Resolution No. 1836 of the Government of the Russian Federation "On the State Information System "Modern Digital Educational Environment" was adopted. It is planned to develop the state information system "Modern Digital Educational Environment", which, based on the "one-stop-shop" principle, will provide students with access to online courses based on various educational platforms thanks to a unified system of user authentication. The information system is being created as part of the implementation of the federal project "Young Professionals (Increasing the Competitiveness of Professional Education)" of the national project "Education".

The development of online territories will lead to an even greater global competition of universities. Under these conditions, the geographical boundaries of education and science will be blurred and universities will have an additional opportunity to define their own position in the new online space. The introduction of digital transformation processes increases the mobility of scientists, opens up new opportunities for joint research and scientific activities aimed at ensuring the competitiveness of the state in the global arena.

3 CONCLUSIONS

The success of Russian regions in terms of digital leadership is largely ensured by the activity of regional authorities, which should envisage the availability of conditions that provide accessible infrastructure, the creation of digital projects, scientific and technological clusters, where the efforts of educational organizations and enterprises are combined. The incentives for regional development should be readiness for digital transformation, the interaction of universities with flagship enterprises, which make significant steps towards digital technologies, invest serious resources in the development and implementation of innovations.

To ensure a digital social and economic breakthrough, Russian regions must attract many young, talented professionals, future Engineers 4.0, who not only have a good understanding of the essence of current technological changes, but also demonstrate a willingness to innovate, have the necessary competencies, practical experience in working with new tools.

Personnel training, the education system is the main task in the large-scale digital transformation. It is necessary to provide comprehensive support to educational initiatives in constituent entities of the Russian Federation, to provide comprehensive support to digitalisation processes in all aspects of economic activity, which will produce rapid economic effects: intensification and automation of business processes; optimisation of management systems; formation of a reserve for new types of

interactions; acceleration of economic changes; more efficient use of resources.

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